Math 0350 Practice Test 4

$f(x)=3x-1 \quad g(x)=x-5 \quad h(x)=x^2-3$

① $(f\cdot g)(x)=f(x)\cdot g(x)=(3x-1)(x-5)$

$=3x^2-15x-x+5$

$=3x^2-16x+5 \leftarrow$

② $(g-f)x=g(x)-f(x)=x-5-(3x-1)$

$=x-5-3x+1$

$(g-f)(x)=-2x-4 \leftarrow$

③ $(g\circ h)(x)=g(h(x))=$

$g\square=\square-5 \rightarrow g(h(x))=\boxed{x^2-3}-5$

$(g\circ h)(x)=x^2-8 \leftarrow$

④ $(f\circ g)(1)=f(g(1))=f(-4)=?\ \boxed{-13} \leftarrow$

$g(x)=x-5 \Rightarrow g(1)=1-5=-4$

$f(x)=3x-1$

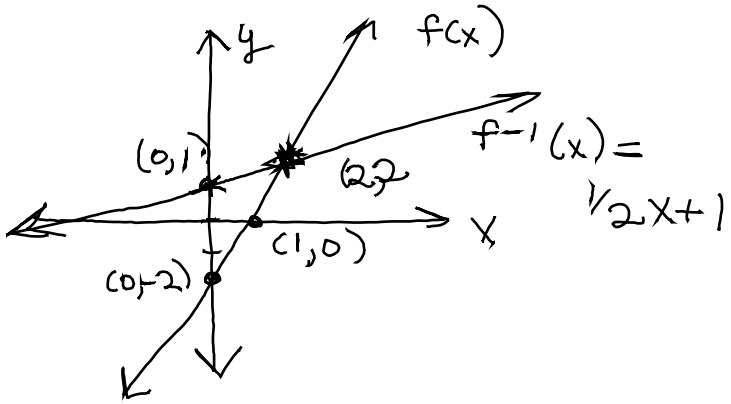
$f(-4)=3(-4)-1=-12-1=-13$

⑤ $f(x)=2x-2$

$y=mx+b$

y intercept $(0,-2)$

$m=\frac{2}{1}\ \uparrow\ \rightarrow$



$y = 2x - 2 \iff x = 2y - 2$

$$\frac{x+2}{2} = \frac{2y}{2}$$

$$\frac{1}{2}x + 1 = y = f^{-1}(x)$$

⑥ $\log_2 6 + \log_2 5 - \log_2 3$ → $\log_b RS = \log_b R + \log_b S$ ←

$\log_2 6 \cdot 5 - \log_2 3$ → $\log_b \frac{R}{S} = \log_b R - \log_b S$

$\log_2 30 - \log_2 3$ ←

$\log_2 \frac{30}{3} = \log_2 10$ ←

⑦ $\log_b N^p = p \log_b N$ ← ←

$4 \log x + \log(x+7) - \log x^2$

→ $4 \log x + \log(x+7) - 2 \log x$ ←

$2 \log x + \log(x+7)$

$\log x^2 + \log(x+7) = \log x^2(x+7)$ ←

⑧ $\log_5 \left(\frac{x^3(x+5)^2}{(x-1)^{1/3}} \right) = \log_5 x^3(x+5)^2 - \log_5 (x-1)^{1/3}$

$= \log_5 x^3 + \log_5 (x+5)^2 - \log_5 (x-1)^{1/3}$ ←

→ $= 3 \log_5 x + 2 \log_5 (x+5) - \frac{1}{3} \log_5 (x-1)$ ←

(9) $\log_5 8 = \frac{\log 8}{\log 5} \approx$ (1.2920)

$\log_b x = \frac{\log x}{\log b} = \frac{\ln x}{\ln b}$

$\log_5 8 = 1.2920 \Rightarrow 5^{1.2920} = 8$

(10) $\log_3 \frac{1}{27} = x$ $\quad 3^x = \frac{1}{27} = \frac{1}{3^3} = 3^{-3}$

$3^x = 3^{-3} \Rightarrow x = -3$

(11) $2^{3x-1} = 6$ $\quad \log_2 6 = 3x - 1$

$\frac{\log_2 6 + 1}{3} = \frac{3x}{3}$

$1.1950 \approx \frac{\frac{\log 6}{\log 2} + 1}{3} \approx \frac{\log_2 6 + 1}{3} = x$

$\log 2^{3x-1} = \log 6$

$(3x-1)\frac{\log 2}{\log 2} = \frac{\log 6}{\log 2}$

$3x - 1 = \frac{\log 6}{\log 2}$

$+1 \qquad +1$

$3x = \frac{\log 6}{\log 2} + 1$

$x = \frac{\frac{\log 6}{\log 2} + 1}{3}$

(12) $\log_4 x = 3$ $\quad 4^3 = x$

$64 = x$

(13) $\ln e^3 = x$ $\quad \log_b b^x = x$

$3 \ln e^1 = x$ $\quad \ln e^3 = 3$

$3 \cdot 1 = x$

$3 = x$

(14) $\log_3 (4x+1) = 2 \Rightarrow 3^2 = 4x+1$

$4x = 2$

$\log_3 (4 \cdot 2 + 1)$ $\quad 9 = 4x+1$

$\log_3 (8+1)$ $\quad 8 = 4x$

$\log_3 9 = 2$ $\quad 2 = x$

(15) $\log_7 4 + \log_7 x = 1$

$\log_7 4x = 1$

$7^1 = 4x$

$\frac{7}{4} = x$

(16) $\log(x+1) - \log(x-2) = 2$

$\log \frac{x+1}{x-2} = 2 \Rightarrow 10^2 = \frac{x+1}{x-2}$

$(x-2)\ 100 = \frac{x+1}{x-2}\ (x-2)$

$100x - 200 = x + 1$

$-x \qquad -x$

$99x - 200 = 1$

$+200 \quad +200$

$99x = 201$

$x = \frac{201}{99}$

(17) $3^{\log_3 x} = 5 \qquad b^{\log_b x} = x$

$x = 5$

(18) $\log_x 4 = 2 \Rightarrow x^2 = 4$

$x = 2$

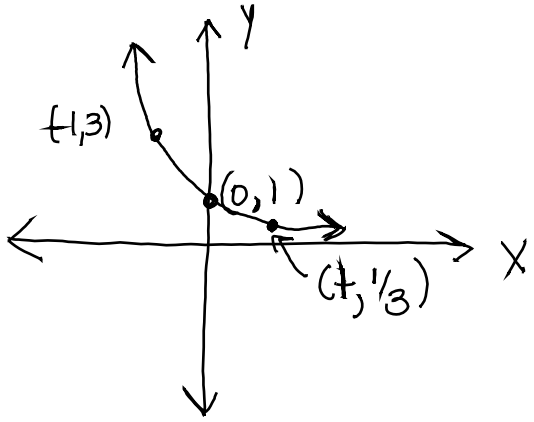
(19) $\ln_e(5x-6) = 3 \qquad e^3 = 5x - 6$

$e^3 + 6 = 5x$

$5.2171 \approx \frac{e^3+6}{5} = x$

$y = \left(\frac{1}{3}\right)^x$

x	$\left(\frac{1}{3}\right)^x$	y
-1	$\left(\frac{1}{3}\right)^{-1}$	3
0	$\left(\frac{1}{3}\right)^{0}$	1
1	$\left(\frac{1}{3}\right)^{1}$	$\frac{1}{3}$

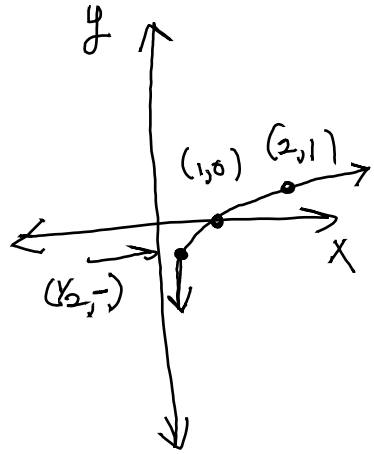


domain $(-\infty, \infty)$
range $(0, \infty)$

(21) $g(x) = y = \log_2 x$ $\quad 2^y = x$

y	2^y	x
-1	2^{-1}	$\frac{1}{2}$
0	2^0	1
1	2^1	2

x	y
$\frac{1}{2}$	-1
1	0
2	1



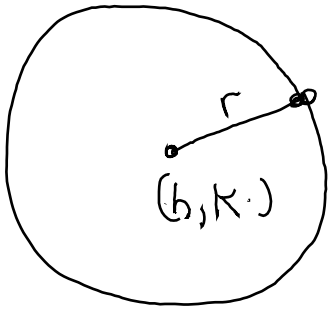
domain $(0, \infty)$ ←
range $(-\infty, \infty)$ ←

(22) $A = P\left(1 + \frac{r}{n}\right)^{nt}$

$= 8000\left(1 + \frac{.06}{12}\right)^{12 \cdot 2}$

$8000\left(1 + (.06 \div 12)\right) \wedge (12.2) \approx$

$\$ 9017.28$



$(x-h)^2+(y-k)^2=r^2$ ←

(23) $r=3$ center $(2,-1)$

h k

$(x-2)^2+(y-(-1))^2=3^2 \rightarrow (x-2)^2+(y+1)^2=9$ ←

(24) $(x+3)^2+(y-2)^2=25$

$(x-h)^2+(y-k)^2=r^2$ $\quad 25=r^2$, $5=r$

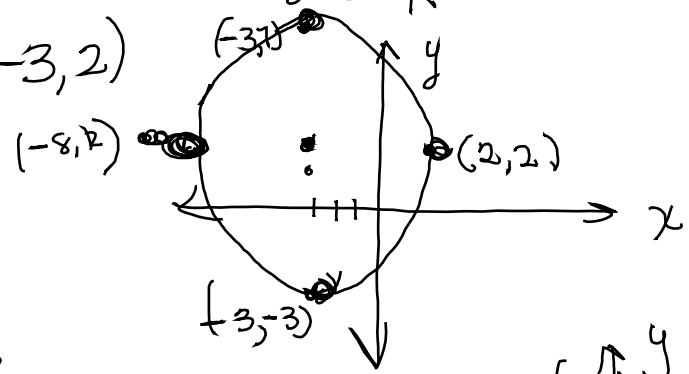
$(x+3)^2=(x-h)^2$ $\quad (y-2)^2=(y-k)^2$

$x+3=x-h$ $\quad y-2=y-k$

$+3=-h$ $\quad -2=-k$

$-3=h$ $\quad 2=k$

$r=5$ center $(-3,2)$



(25) $x^2+y^2=49$

$(x-0)^2+(y-0)^2=7^2$

Center $(0,0)$ $r=7$